BLENDING ANIMATION NARRATIVE

Through its *2002 Wet Weather Survey* and an earlier survey on blending, AMSA found that many of its public agency members utilize the practice of blending as part of their peak wet weather flow management. The practice of blending consists of combining primary effluent flow with secondary effluent followed by disinfection and dechlorination. The combined flow is released at the normal point of discharge and meets all permit limits. Blending has been practiced at publicly owned treatment works (POTWs) since the Clean Water Act's Construction Grants Program began funding secondary treatment facilities and has long been recognized by EPA as an effective way of managing peak wet weather flows. Without blending, such peak flows would damage the treatment process by hydraulically overloading the secondary process and "washing out" the biomass needed to achieve biochemical oxygen demand reduction.

Several EPA Regions have incorrectly concluded that blending constitutes a violation of the "bypass" provisions of the Clean Water Act and this confusion has lead to inconsistent regulatory approaches within the various EPA Regions. EPA has stated that guidance at the national level is needed to address the inconsistent regulatory approaches to blending, and AMSA agrees. In the process of developing this guidance, EPA has received input from a variety of stakeholders. As part of AMSA's input to EPA, an animation was developed which shows how blending is commonly practiced by POTWs. This animation describes four situations as follows:

> Normal Operation: shows a typical secondary treatment plant functioning under normal dry weather flow conditions.
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> Scenario I: shows the impact to the treatment process during peak wet weather flows when blending is not allowed.
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> Scenario II: shows the negative impact to the treatment process when blending is allowed, but with the regulatory mandate that all existing storage must be utilized first.
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> Scenario III: AMSA's recommended approach to blending whereby the available storage is reserved in an attempt to capture the peak of the storm and minimize public health impacts associated with overflows within the collection system.

The following paragraphs are narrative descriptions of the animation:

NORMAL OPERATION

In normal operation all dry weather flows received complete secondary treatment. In the primary sedimentation tanks the settleable solids accumulate and are removed and sent to the solids processing units. The dissolved organic matter is converted to cellular biomass in the aeration tanks and the mixed liquor (biomass) is settled in the secondary clarifiers. The solids collecting in the clarifiers are referred to as activated sludge and are returned to the aeration tanks with some portion wasted to the solids handling process. This is done to maintain the correct concentration of biomass at all times within the aeration tanks.

SCENARIO I

Under this scenario no blending is allowed. As the rain beings to fall the flows in the treatment plant increase. These wet weather flows are quite diluted compared to normal dry weather flows and the animation depicts this by the change in color to a blue-gray hue. These flows proceed through the sedimentation tanks and on to the aeration basins where they exceed the hydraulic capacity of the aeration basins. This results in "wash out" of the mixed liquor biomass. The solids-laden flow proceeds to the secondary clarifiers where the sludge blanket on the bottom of the tank increases, eventually resulting in hydraulic overload of the clarifiers. When the clarifiers are hydraulically overloaded they cannot effectively capture all of the biomass and the biomass is carried over the effluent weirs instead of being returned to the aeration tanks. This washout reduces the concentration of the needed biomass in the aeration tanks and the ability of the treatment process to remove biochemical oxygen demand is compromised. When the storm stops the biomass has been depleted and it must be re-grown before effective treatment can be reestablished. This can take days depending upon the particular conditions.

SCENARIO II

In this scenario blending is allowed but regulations state that any available storage must be utilized prior to the initiation of blending. This is not an effective use of storage, since a typical wet weather hydrograph has the shape of a triangle where flows ramp up, reach a peak, and then ramp down. The initial wet weather flows can very quickly fill any available storage, leaving the plant operator no choice but to throttle the influent gates/pumps or take in the peak flows and damage the treatment process. In the animation, this scenario starts with normal flows. The rains commence and the influent flows become much greater and more diluted. The storage basin is immediately filled but the peak wet weather flow has yet to occur. As the rain continues, the blending channel is activated and the primary effluent is blended with the secondary effluent. However the rain continues and the flows finally peak. But with no storage the dilute peak flow moves through the aeration basin and into the clarifiers resulting in biomass wash-out. This scenario may not always occur exactly as described, but the intent is to demonstrate that allowing the operator the flexibility of determining when to utilize storage during a storm can provide better protection of the plant and possibly avoid unnecessary overflows in the collection system.

SCENARIO III

This scenario again starts with normal operation. As in Scenario I and II the rains begin and flows increase. However unlike Scenario II there is no regulatory mandate that all storage must be utilized prior to initiation of blending. As the flows increase and the capacity of the secondary facilities are reached the operator initiates blending. Concurrently, the operator is monitoring the storm utilizing meteorological data such as

Doppler radar (via the Internet) and weather reports. Understanding, through experience, how the system responds to storms, the operator can gage when the peak of the storm will hit. As the peak flows reach the plant, the storage basin is filled. In the animation the rain stops, the storage basin is drained and the plant returns to normal operation. It is recognized that each storm does not look the same and the activation of storage is more of an art than a science; however, the capability of treating all the flows and capturing the peak for subsequent treatment is greatly enhanced if flexibility on the use of storage is not restricted regulations. It is important to note that in this scenario all treatment processes are being utilized to 100% of their capacity and thus maximum treatment is being provided.